AMENDMENTS TO THE CLAIMS

1. (Original) A manufacturing method of a scanning optical system including a light source for emitting a laser beam, a polygon mirror for scanning the laser beam in a main scanning direction by reflecting the laser beam with reflecting surfaces while revolving around its central axis in a fixed direction, and an imaging optical system including a plurality of lens surfaces for converging the laser beam reflected and scanned by the polygon mirror on a target surface, the method comprising:

determining whether a following conditions (1) is satisfied:

$$H/2 > |2\beta D(D - Rz_1)/Rz_1| \quad \cdots\cdot (1)$$

where, "H" denotes a width of each reflecting surface of the polygon mirror in an auxiliary scanning direction perpendicular to the main scanning direction, "β" denotes an incident angle [radian] of the laser beam on the reflecting surface of the polygon mirror in the auxiliary scanning direction, "D" denotes a distance between the reflecting surface of the polygon mirror and a first lens surface at the front end of the imaging optical system, and "Rz_1" denotes a radius of curvature of the first lens surface in the auxiliary scanning direction; and

forming anti-reflection coating on the first lens surface only when the condition is satisfied.

2. (Original) The manufacturing method of a scanning optical system according to claim 1,

wherein the imaging optical system includes a scanning lens having the first lens surface and a field curvature correction lens being placed between the scanning lens and the target surface,

wherein either lens surface of the scanning lens is formed as an anamorphic aspherical surface, and

wherein either lens surface of the field curvature correction lens is formed as a two dimensional polynomial aspherical surface.

3. (Original) The manufacturing method of a scanning optical system according to claim 1, wherein a plurality of the laser beams are incident on the reflecting surface of the polygon mirror from directions that are inclined in the auxiliary scanning direction.

4. (Original) The manufacturing method of a scanning optical system according to claim 3, wherein the directions of the incident laser beams inclined in the auxiliary scanning direction are set to be symmetrical with respect to an optical axis of a scanning lens having the first lens surface.

5. (Original) The manufacturing method of a scanning optical system according to claim 1, wherein the forming anti-reflection coating on a first lens surface forms the anti-reflection coating on the first lens surface only when the following condition (2), in addition to the condition (1), is satisfied:

$$|W| \leq f\,[(4\pi/P) + \alpha + (2a(Ry_1\text{-}D)/Ry_1)] \quad \cdots\cdot (2)$$

where, $|a| \leq W/f$, "W" denotes a maximum image height in a scanning range on the scan target surface, "f" denotes a total focal length of the imaging optical system, "P" denotes the number of the reflecting surfaces of the polygon mirror, "α" denotes an angle of the laser beam incident on the polygon mirror relative to an optical axis of the imaging optical system measured in the main scanning direction [radian], "a" denotes a swing angle of the laser beam reflected by the polygon mirror relative to the optical axis of the imaging optical system measured in the main scanning direction [radian], and "Ry_1" denotes a curvature radius of the first lens surface in the main scanning direction.

6. (Original) The manufacturing method of a scanning optical system according to claim 5,

wherein the imaging optical system includes a scanning lens having the first lens surface and a field curvature correction lens being placed between the scanning lens and the target surface,

wherein either lens surface of the scanning lens is formed as an anamorphic aspherical surface, and

wherein either lens surface of the field curvature correction lens is formed as a two dimensional polynomial aspherical surface.

7. (Original) The manufacturing method of a scanning optical system according to claim 5, wherein a plurality of the laser beams are incident on the reflecting surface of the polygon mirror from directions that are inclined in the auxiliary scanning direction.

8. (Original) The manufacturing method of a scanning optical system according to claim 7, wherein the directions of the incident laser beams inclined in the auxiliary scanning direction are set to be symmetrical with respect to an optical axis of a scanning lens having the first lens surface.

9. (Currently Amended) A manufacturing method of a scanning optical system including a light source for emitting a laser beam, a polygon mirror for scanning the laser beam in a main scanning direction by reflecting the laser beam with reflecting surfaces formed on its lateral faces while revolving around its central axis in a fixed direction, and an imaging optical system including a plurality of lens surfaces for converging the laser beam

reflected and scanned by the polygon mirror on a target surface, the method comprising:

determining whether a following condition (3) is satisfied:

$$H/2 > |\beta D(D-Lz)/Lz| \quad \cdots\cdot (3)$$

where, $Lz = Rz_1Rz_2D/(2NRz_1D-2(N-1)Rz_2D-Rz_1Rz_2)$, "H" denotes a width of each reflecting surface of the polygon mirror in an auxiliary scanning direction perpendicular to the main scanning direction, "β" denotes an incident angle [radian] of the laser beam on the reflecting surface of the polygon mirror in the auxiliary scanning direction, "D" denotes a distance between the reflecting surface of the polygon mirror and a first lens surface at the front end of the imaging optical system, "Rz_1" denotes a curvature radius of the first lens surface in the auxiliary scanning direction, "Rz_2" denotes a curvature radius of a second lens surface next to the ~~front~~ first lens surface in the auxiliary scanning direction, and "N" denotes a refractive index of a medium between the first lens surface and the second lens surface for the laser beam; and

forming anti-reflection coating on the second lens surface of the imaging optical system only when the condition is satisfied.

10. (Original) The manufacturing method of a scanning optical system according to claim 9,

wherein the imaging optical system includes a scanning lens having the first lens

surface and a field curvature correction lens being placed between the scanning lens and the target surface,

wherein either lens surface of the scanning lens is formed as an anamorphic aspherical surface, and

wherein either lens surface of the field curvature correction lens is formed as a two dimensional polynomial aspherical surface.

11. (Original) The manufacturing method of a scanning optical system according to claim 9, wherein a plurality of the laser beams are incident on the reflecting surface of the polygon mirror from directions that are inclined in the auxiliary scanning direction.

12. (Original) The manufacturing method of a scanning optical system according to claim 11, wherein the directions of the incident laser beams inclined in the auxiliary scanning direction are set to be symmetrical with respect to an optical axis of a scanning lens having the first lens surface.

13. (Original) The manufacturing method of a scanning optical system according to claim 9, wherein the forming anti-reflection coating on a second lens surface forms the anti-reflection coating on the second lens surface only when the following condition (4), in

addition to the condition (3), is satisfied:

$$|W| \leq f[(4\pi/P)+ \alpha +(a(Ly-D)/Ly)] \cdots (4)$$

where, $|a| \leq W/f$, $Ly = Ry_1Ry_2D/(2NRy_1D-2(N-1)Ry_2D-Ry_1Ry_2)$, "W" denotes a maximum image height in a scanning range on the scan target surface, "f" denotes a total focal length of the imaging optical system, "P" denotes the number of the reflecting surfaces of the polygon mirror, "α" denotes an angle of the laser beam incident on the polygon mirror relative to an optical axis of the imaging optical system measured in the main scanning direction [radian], "a" denotes a swing angle [radian] of the laser beam reflected by the polygon mirror relative to the optical axis of the imaging optical system measured in the main scanning direction, "Ry_1" denotes a curvature radius of the first lens surface in the main scanning direction, and "Ry_2" denotes a curvature radius of the second lens surface in the main scanning direction.

14. (Original) The manufacturing method of a scanning optical system according to claim 13,

wherein the imaging optical system includes a scanning lens having the first lens surface and a field curvature correction lens being placed between the scanning lens and the target surface,

wherein either lens surface of the scanning lens is formed as an anamorphic aspherical

surface, and

wherein either lens surface of the field curvature correction lens is formed as a two dimensional polynomial aspherical surface.

15. (Original) The manufacturing method of a scanning optical system according to claim 13, wherein a plurality of the laser beams are incident on the reflecting surface of the polygon mirror from directions that are inclined in the auxiliary scanning direction.

16. (Original) The manufacturing method of a scanning optical system according to claim 15, wherein the directions of the incident laser beams inclined in the auxiliary scanning direction are set to be symmetrical with respect to an optical axis of a scanning lens having the first lens surface.

CONCLUSION

By the present Amendment, claim 9 has been amended for clarification, and no new matter is contained therein. Thus, the Examiner is respectfully requested to enter the foregoing amendment prior to examination of the above identified patent application.

Should the Examiner have any questions, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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